
User's Manual

Model 9513P PC/AT Chassis

22732A

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IMPORTANT!

Always use caution when handling/operating your system. To ensure maximum safety, ***always remove power from the system and disconnect all power cords before you remove the unit cover. Only qualified, experienced, authorized electronics service personnel should access the unit's interior.*** Use extreme caution when installing/removing components. If you have any questions, please contact Texas Micro's Technical Support department at 1-800-627-8700 or 1-713-541-8200.

A LIRE IMPERATIVEMENT

Quand vous manipulez ou utilisez votre système, faites preuve en toutes circonstances de la plus grande prudence. Pour garantir une sécurité maximale, débranchez toujours l'alimentation du système et déconnectez tous les câbles d'alimentation avant de retirer le couvercle. Seuls des techniciens électroniciens qualifiés et expérimentés peuvent avoir accès à l'intérieur de votre système. Quand vous installez ou désinstallez des composants, soyez particulièrement attentif. Afin de garantir votre sécurité, tous les avertissements, remarques et informations relatives à la sécurité sous sont fournis en français, anglais et allemand. Si vous désirez poser des questions complémentaires, n'hésitez pas à prendre contact avec le Département d'assistance technique de Texas Micro au (USA) 1-713-541-8200.

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Seien Sie immer vorsichtig, wenn Sie mit Ihrem System umgehen oder es bedienen. Um größtmögliche Sicherheit zu gewährleisten, schalten Sie Ihr System immer aus und ziehen Sie alle Netzkabel, bevor Sie die Abdeckung abnehmen. Nur qualifiziertes, erfahrenes Personal für Elektronik sollte am Inneren des Gerätes arbeiten. Seien Sie äußerst vorsichtig, wenn Sie Komponenten installieren oder entfernen. Für Ihre Sicherheit sind Hinweise zur Vorsicht, Warnungen und Sicherheitsinformationen in Englisch, Deutsch und Französisch gedruckt. Wenn Sie irgendwelche Fragen haben, setzen Sie sich bitte mit der Abteilung für technische Unterstützung von Texas Micro unter der Rufnummer (USA) 1-713-541-8200 in Verbindung.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at the user's own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by Texas Microsystems, Inc., could void the user's authority to operate the equipment.

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Introduction to the 9513P

This section provides information and technical specifications for the Model 9513P Rackmount PCI/ISA Chassis.

1.1 General Description

Texas Micro's Model 9513P chassis is designed to offer the advantages of the PICMG[™] compliant Peripheral Component Interface (PCI) local bus in a high-performance, ruggedized computer enclosure with alarm capabilities.

This versatile chassis features a 13-slot backplane configured with nine ISA slots, one dedicated CPU slot, and three PCI slots. The combination of the exceptional I/O performance of the PCI local bus (33MHz with a 32-bit datapath and a burst mode of 132MBytes/sec) and the ISA expansion bus is ideal for high-performance video/graphics in data acquisition and telecommunications applications.

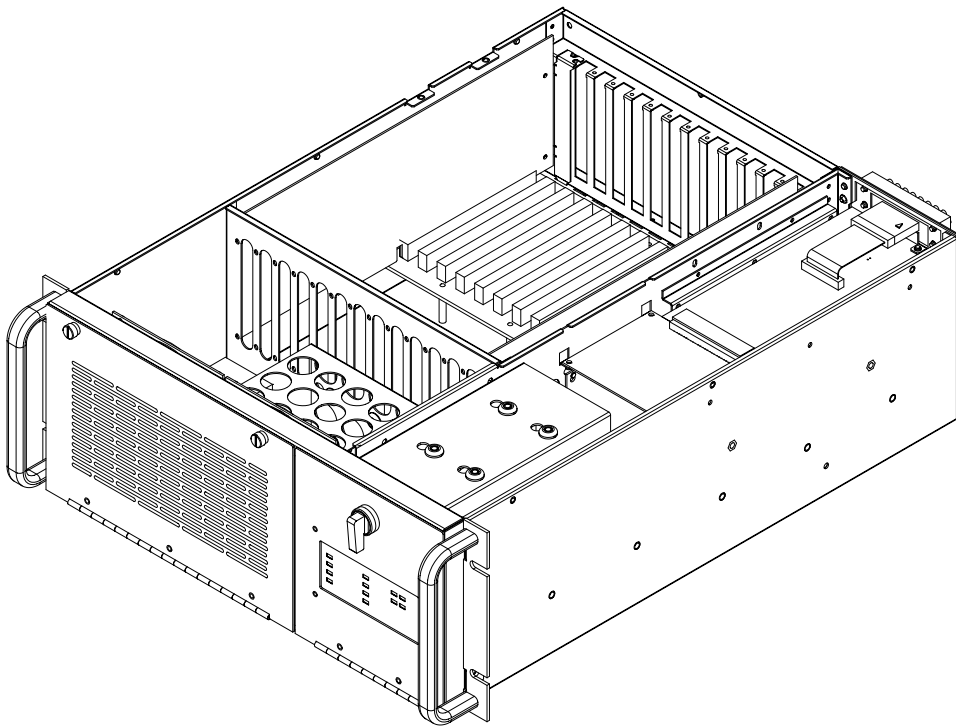
Storage capacity of the Model 9513P includes two 3.5" and two 5.25" peripheral device options for fixed disk, floppy, CD-ROM, or tape backup media. A 375-Watt, 90-264 VAC auto-switching power supply provides power to the backplane and peripheral devices.

The 9513P features a microprocessor-based and battery-backed Alarm Control Unit. It monitors all operational aspects of the computer including input voltage, output voltage, CPU operation, fan failure, temperature (high and low), and circuit breaker status.

When a fault is detected, a concise ASCII message with time stamp is transmitted to the designated remote alarm management center, a dry contact closure is activated, and a front-panel LED is illuminated. This alarm action will occur even under total power failure, since the unit is internally battery-backed. The Alarm Control Unit supports user-programmable messages with remote notification and reset features.

FIGURE 1

9513P Chassis.



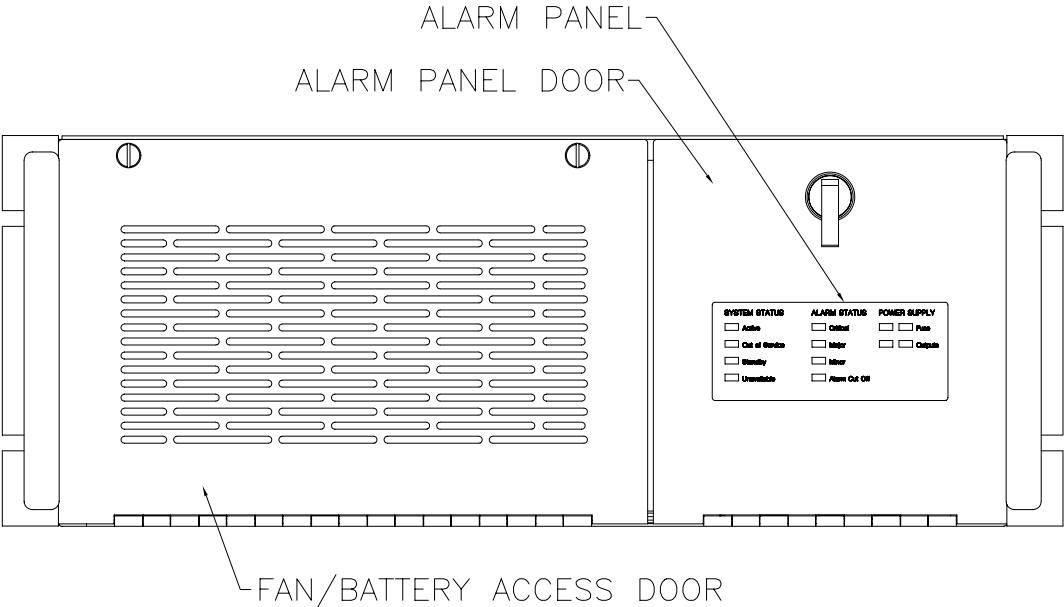
1.2 9513P Components

1.2.1 Front Panel Components

While facing the front of the 9513P Chassis, locate the following (see Figure 2):

- **Fan/Battery Access Door** - This door provides access to the two system fans, the fan filter, the alarm system battery, and the internal disk drive mount.
- **Alarm Panel** - This panel provides ten (10) LED indicators that provide status for the system, alarm, and power supply (see Chapter 6 for more information).
- **Alarm Panel Door** - This door provides access to the front access drive bays as well as the Alarm Cutoff and System Reset buttons.
- **Front Drive Bay** - The 9513P may be equipped with up to two (2) 5.25" half-height drives.
- **Alarm Cut Off Button**- This button, labeled "ACO" disables the audio portion of the alarm status program and illuminates the red "Alarm Cut Off" LED on the Alarm Panel.
- **System Reset Button** - This button, labeled "RESET", will reset (reboot) the system when pushed.

FIGURE 2 Front panel components.

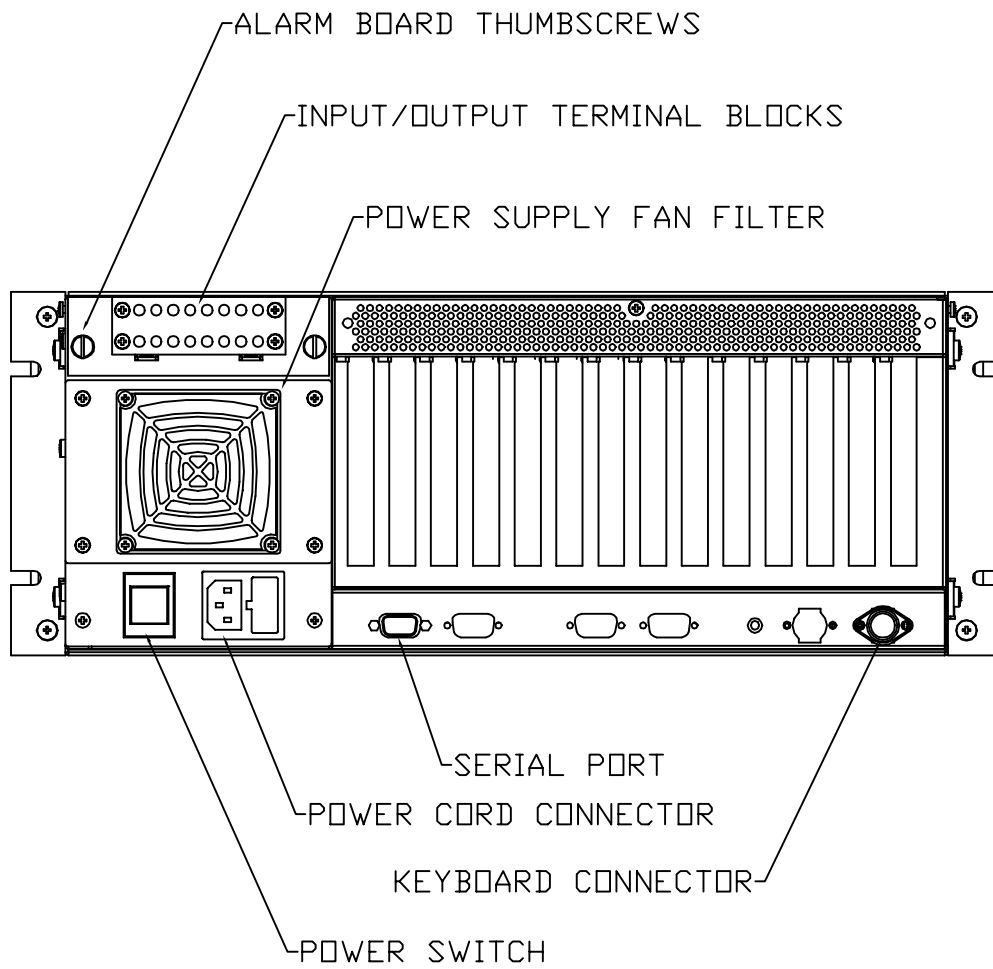


1.2.2 Rear Panel Components

While facing the rear of the 9513P Chassis, locate the following (see Figure 3):

- **Power Switch** - Enables you to control power to the 9513P Chassis.
- **Power Cord Connector** - This connector provides the DC power connection to the 9513P.
- **Keyboard Connector** - A standard 5-pin DIN interface for keyboard connection.
- **Serial Port** - A standard 9-pin connector for serial communication with the alarm board.
- **Input/Output Terminal Blocks** - These blocks provide the connection for wires to remote indicators and switches to the alarm board.
- **Alarm Board Thumbscrews** - Loosen these thumbscrews to slide the alarm board from the chassis for maintenance or replacement.
- **Power Supply Fan Filter** - Helps prevent dust from building up on the power supply and internal components.

FIGURE 3 Rear panel components.



1.3 PICMG

Texas Micro is a charter member of the PICMG (PCI Industrial Computer Manufacturers Group), founded to develop standards for PCI-based passive backplane systems.

1.4 PCI

The PCI Local Bus is a high-performance, 32-bit bus with multiplexed address and data lines. It is intended for use as an interconnect mechanism between highly integrated peripheral controller components, peripheral add-in boards, and processor/memory systems.

The processor/cache/memory subsystem is connected to PCI through a "PCI Bridge." This bridge provides a low-latency path through which the processor may directly access PCI devices mapped anywhere in the memory or I/O address spaces. It also provides a high-bandwidth path, allowing PCI masters direct access to main memory.

See Chapter 4 for an illustration of the 13-slot PCI backplane.



Please observe the following warnings and cautions.

WARNING: *Only experienced, authorized electronics service personnel should access the interior of the 9513P Chassis. If you have any questions, please contact Texas Micro's Technical Support Department at 1-800-627-8700.*

WARNUNG: *Nur qualifiziertes, erfahrenes Personal für Elektronik sollte am Inneren des Gertes arbeiten. Wenn Sie irgendwelche Fragen haben, wenden Sie sich bitte an die Abteilung für technische Unterstützung von Texas Micro unter der Rufnummer (USA) 1-713-541-8200.*

AVERTISSEMENT: *Seuls des techniciens électroniciens qualifiés et expérimentés sont habilités à avoir accès aux éléments internes. Si vous désirez poser des questions complémentaires, n'hésitez pas à prendre contact avec le Département d'assistance technique de Texas Micro au (USA) 1-713-541-8200.*

CAUTION: *Always remove power from the system before inspecting or maintaining the chassis. To ensure no damage or injury occurs, the power cord should be disconnected from the power source.*

VORSICHT: Schalten Sie Ihr System vor Inspektion oder Wartung des Gehäuses immer aus. Zur Vermeidung von Personenschäden sollte das Netzkabel aus der Stromquelle herausgezogen werden.

ATTENTION: Débranchez toujours l'alimentation du système avant d'effectuer une inspection ou un entretien du boîtier. Pour garantir une sécurité totale, il u a lieu de déconnecter le câble d'alimentation de la source d'alimentation.

WARNING: No moisture or condensation may come in contact with the 9513P Chassis' electronic components or cables/connectors. Damage to sensitive components could occur. The internal components of the 9513P Chassis are very sensitive to static discharge. Therefore, Texas Micro recommends using a grounding wrist strap to remove all static electricity before touching the components. While out of the unit, 9513P components should be placed into a static-shielding bag.

Note: The 9513P provides connection points at the rear panel and behind the alarm panel door for wrist strap connection.

WURNUNG: Die elektronischen Komponenten oder Kabel Anschlüsse des 9513P-Gehäuses dürfen keiner Feuchtigkeit oder Kondensation ausgesetzt werden. Dies könnte Schaden an empfindlichen Komponenten verursachen. Die internen Komponenten des 9513P-Gehäuses sind gegenüber statischer Entladung sehr empfindlich. Daher empfiehlt Texas Micro das Tragen eines Erdungsarmbands, damit jede statische Elektrizität vor Berühren der Komponenten entladen wird. 9513P-Komponenten sollten außerhalb des Gehäuses in einen antistatischen Beutel gelegt werden.

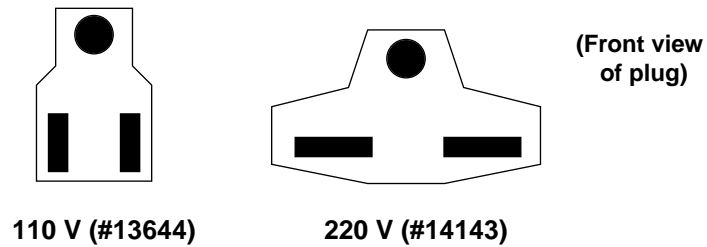
ATTENTION: Les composants électroniques et les câbles et connecteurs du boîtier du 9513P ne peuvent en aucun cas être exposés l'humidité ou à la condensation. Une telle exposition peut endommager certains éléments sensibles. Les éléments internes du boîtier du 9513P sont hautement sensibles à la décharge statique. En conséquence, Texas Micro recommande, avant de toucher les éléments, de les décharger de leur électricité statique au moyen d'une dragonne de mise à la terre. Pendant tout le temps où ils sont démontés, les éléments du 9513P doivent être placés dans un sac antistatique.

2.1 Connecting the Keyboard

The 9513P keyboard connector is located on the far right side of the back panel (see Figure 3). Simply plug an AT-compatible keyboard with a standard 5-pin DIN connector into this slot.

2.2 Powering On

To power-up, connect the power cord to the Power Cord Connector and a grounded power source, then flip the Power Switch ON. The 9513P contains an autosensing 375-watt power supply that accepts input power from a 110-volt or a 220-volt power source. However, ensure that the power cord is appropriate for the power source you are using (see below; TMI part numbers for the power cords are provided).



2.3 Resetting the System

If the system should “lock up” (become inoperable) during operation and your operating system reset procedure (i.e. the CTRL-ALT-DEL sequence, etc.) is ineffective, you can reset (reboot) the 9513P by pressing the bottom button (marked “RESET”) behind the Alarm Board panel (see Section 1.2.1). The system may also be reset remotely via the Alarm Board (see Chapter 6).

2.4 Removing the Cover

The procedure for removing the 9513P cover is as follows:

1. Power-down the computer. ***To ensure that no damage or injury occurs, disconnect the system's power cord from the power source. Be sure to wear a ground wrist strap or other static-dissipating device.***

Schalten Sie den Computer ab. **Ziehen Sie zur Vermeidung von Schäden oder Verletzungen das Netzkabel des Systems aus der Stromquelle heraus. Tragen Sie immer ein Erdungsarmband oder ein anderes Entladegerät.**

Débranchez l'ordinateur. **Pour prévenir tout dégât ou blessure, déconnectez le câble d'alimentation de la source d'alimentation et portez une dragonne de mise à la terre ou un autre dispositif antistatique.**

2. Locate and loosen the Phillips-head screw positioned in the top of the back panel and the screws along the side of the chassis securing the cover.
3. Lift the cover slightly at the rear and slide the cover off towards the rear.

2.5 Installing a Circuit Card

Before installing any circuit card into the 9513P, consult the documentation provided with the card(s). Installation instructions provided with the cards should be followed. Use a grounding wrist strap or other static-dissipative device. The procedure for installing circuit cards in the 9513P is as follows:

1. Power-down the computer. ***To ensure that no damage or injury occurs, disconnect the system's power cord from the power source. Be sure to wear a grounding wrist strap or other static-dissipating device.***

Schalten Sie den Computer ab. **Ziehen Sie zur Vermeidung von Schäden oder Verletzungen das Netzkabel des Systems aus der Stromquelle heraus. Tragen Sie immer ein Erdungsarmband oder ein anderes Entladegerät.**

Débranchez l'ordinateur. **Pour prévenir tout dégât ou blessure, déconnectez le câble d'alimentation de la source d'alimentation et portez une dragonne de mise à la terre ou un autre dispositif antistatique.**

2. Remove the chassis cover (see Section 2.4).
3. Locate the desired bus location for installation (user's choice, although it is suggested that a location providing maximum distance between boards is chosen to enhance ventilation).
4. Remove the I/O bracket from the rear of the chassis. This component occupies the area where the card's I/O bracket is accessed through the back of the chassis.
5. Place the board ends into the appropriate card guide and card-end slot in the chassis. Lower the board into position and carefully push the card-edge connector into the slot. Ensure that the I/O bracket is accessible through the back of the chassis.
6. Secure the card-edge I/O bracket to the hold-down lip and attach any required cables.

The 9513P can be converted into a “rack-mount” system for extra versatility. The 9513P Chassis is designed to be mounted in a 19” RETMA rack. Equivalent slides from other manufacturers with matching hole spacing and alignment may also be used.

Do not attempt to rack-mount the 9513P by attaching it from the front panel only. Ensure that all power cords are disconnected before mounting, and that no power is being fed to the chassis before you attach rack slides.

Der 9513P darf nur an den Halteschienen eingebaut werden. Vor Einbau müssen alle Netzkabel gelöst werden. Das Gerät darf beim Anbringen der Gleitschienen nicht unter Strom stehen.

Ne pas essayer de monter le 9513P sur un rack en le fixant uniquement par le panneau avant. Vérifier que tous les cordons d'alimentation sont débranchés avant de procéder au montage et que le châssis n'est pas sous tension avant de monter les coulisses du rack.

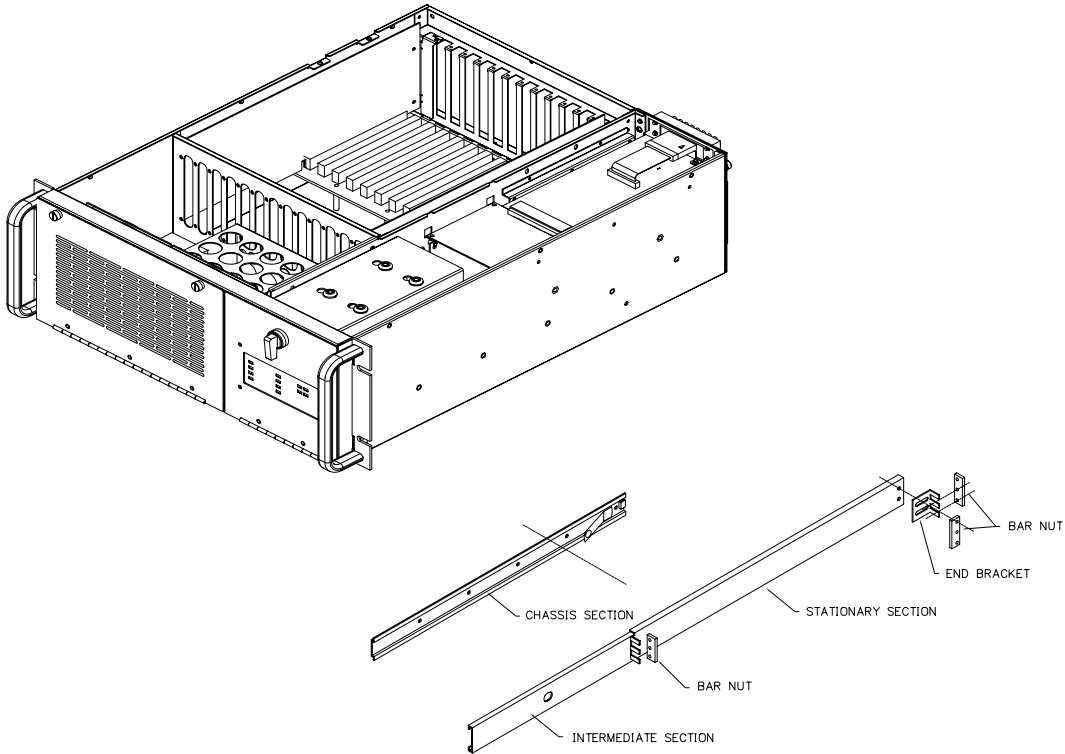
The procedure for attaching rack slides to the 9513P Chassis and the RETMA rack and mounting the 9513P Chassis is as follows (see Figure 5):

1. One complete slide is required for each side of the chassis. A slide consists of three (3) separate sections (see Figure 5):
 - a chassis section
 - an intermediate section
 - a stationary section

The chassis section, as the name implies, should be attached to the chassis as pictured in Figure 5 (five screws are required). The stationary and intermediate sections are coupled into one unit.

2. Attach the stationary section to the 19" rack, using the end bracket and bar nuts as pictured in Figure 5.
3. Attach slides to both sides of the rack. *To avoid damage to internal components, do not use screws longer than 3/8" to attach rack slides. Gleitschienen nur mit maximal 9,5 mm (3/8 Zoll) langen Schrauben befestigen, um die Beschädigung interner Bauteile zu vermeiden. Pour éviter d'endommager les composants internes, ne pas utiliser de vis de plus de 9,5 mm (3/8 po.) pour fixer les coulisses.*
4. Insert the computer into the rack by mating the chassis sections with the attached intermediate and stationary sections. Make sure that the computer is level and properly aligned when sliding it onto the rack.
5. Push the chassis completely into the rack. Use appropriate hardware to secure the chassis' front panel to the rack (consult the rack manufacturers' documentation for proper procedures).

FIGURE 5 Rack slide assembly.



General Maintenance

The 9513P Series computer is a rugged chassis requiring minimal maintenance. However, an adequate maintenance program will enhance its ability to provide trouble-free performance. Periodically inspect the 9513P and peripherals to ensure that they are clean and free of wear. Malfunctioning equipment should be replaced.

WARNING: *Only experienced, authorized electronics service personnel should access the interior of the 9513P Chassis. If you have any questions, please contact Texas Micro's Technical Support Department at 1-800-627-8700.*

WARNUNG: *Nur qualifiziertes, erfahrenes Personal für Elektronik sollte am Inneren des Gertes arbeiten. Wenn Sie irgendwelche Fragen haben, wenden Sie sich bitte an die Abteilung für technische Unterstützung von Texas Micro unter der Rufnummer (USA) 1-713-541-8200.*

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4.1 Fan Filter Maintenance

The procedure for maintaining the fan filter is as follows:

1. Turn the two (2) thumbscrews located on the front panel in a counterclockwise direction until loose, then carefully lower the filter door.
2. Grasp the filter handle and slide the filter from its compartment.
3. Wash the filter with a mild detergent; let it dry thoroughly.
4. Replace the filter.
5. Raise the filter door to its previous position.
6. Turn the thumbscrews clockwise until tight.

Regular cleaning of the air supply filter must be maintained to ensure efficient thermal control of the system. Using a mild detergent and warm water, thoroughly clean, rinse and dry the filter material at 30-day intervals. At your own discretion, you may remove the filter material to improve air flow to the system in a clean environment.

4.2 CPU Lithium Battery

If your CPU contains a lithium battery, please heed the following caution statements.

CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER. DISCARD BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

ACHTUNG: WENN BATTERIE NICHT ORDNUNGSGEMÄß AUSGEWECHSELT WIRD, BESTEHT EXPLOSIONSGEFAHR. BATTERIE NUR DURCH EINE BATTERIE GLEICHEN ODER GLEICHWERTIGEN TYP (VOM HERSTELLER EMPFOHLEN) ERSETZEN. VERBRAUCHTE BATTERIEN LAUT ANWEISUNGEN DES HERSTELLERS ENTSORGEN.

ATTENTION: IL Y A DANGER D'EXPLOSION S'IL Y A REMPLACEMENT INCORRECT DE LA BATTERIE. REMPLACER UNIQUEMENT AVEC UNE BATTERIE DU MÊME TYPE OU D'UN TYPE RECOMMANDÉ PAR LE CONSTRUCTEUR. METTRE AU RÉBUT LES BATTERIES USAGÉES CONFORMÉMENT AUX INSTRUCTIONS DU FABRICANT.

4.3 Alarm Board Removal

To remove the alarm board for maintenance or replacement, turn alarm panel thumbscrews counterclockwise to loosen, then pull the board from the chassis.

4.4 Power Supply Fan Filter Maintenance

To maintain the power supply fan filter, simply pull the filter from its slot in the rear panel, wash the filter with a mild soap-and-water solution, let it dry thoroughly, then place the filter back in position.

5.1 Return Procedure

In instances where Texas Microsystems products require service, the factory must be contacted and a Return Goods Authorization (RGA) must be obtained. When requesting an RGA number, please provide the product serial number. When authorization is given, a Return Goods Authorization number will be issued. This RGA number must appear on all packing materials and correspondence to ensure proper handling. In all instances, including return for warranty repair, an RGA must be obtained and so noted or the factory will be unable to accept delivery.

5.2 Technical Support

Texas Microsystems provides on-line technical support available during weekdays from 7:00 a.m. to 6:00 p.m. (Central Time) for your convenience. Our staff of trained professionals welcomes the opportunity to answer your questions and assist you with your technical requirements. Just call us toll-free at:

1-800-627-8700

To expedite your request, please have available the Texas Microsystems product model and serial number.

Note: Outside the U.S., call 1-713-541-8200.

Alarm System Application

6.1 Introduction

The 9513P alarm board plugs into an interface board behind the rear panel. The alarm board has ten LED indicators that are visible through the front alarm panel of the computer. These LEDs indicate the following:

- System Status,
- Alarm Status, and
- Power Supply Status.

The alarm board is responsible for:

- monitoring the application, temperature, fans, power supply input and output voltages, battery charge, and the alarm board circuitry,
- communicating with the application and maintenance center via line messages,
- transferring messages between the application and maintenance center, and
- activating audible and visual alarms in the event of system failures (referred to as alarm conditions).

When no alarm conditions are present, the following occur:

- The application must send timer reset messages to the alarm board at least once every 30 seconds starting four minutes after power-up. These messages indicate that the application, operating system, and system CPU card are working properly.
- The alarm board can transmit messages from the maintenance center to the application and from the application to the maintenance center.
- The application can request status information from the alarm board and the alarm board will respond.

If the alarm board does not receive the timer reset message or detects other alarm conditions, it will immediately activate the appropriate alarm panel LEDs and audible alarms and send an alarm message to the maintenance center. If the application detects alarm conditions, it can use line messages to notify the alarm board of these conditions and indicate which alarms should be activated. Remote alarm indicators can be activated using five hard-contact outputs on the rear panel of the computer. The alarm board will activate one or more of these outputs when it activates the speaker and alarm panel LEDs. Four of these hard-contact outputs can be programmed for other uses by the application.

You can acknowledge alarms, i.e. turn off audible alarms and Alarm Status LEDs and disable the hard-contact outputs, by pressing the Alarm Cut-off button on the front panel of the computer. When an alarm condition clears, you can reset the CPU board and the alarm board using the Reset button on the front panel. Alarm Cut-off and Reset can also be activated from a remote maintenance center using the hard-contact inputs or the RS-232 serial port on the rear panel. Enabling the RESET input will also reset both the CPU board and the alarm board. Initiating reset via a line message will reset the CPU board only.

6.2 Alarm Messages

When the alarm board detects an alarm condition other than alarm board failure, it sends a line message to the maintenance center that identifies the Alarm Status (Critical, Major, or Minor) and describes the alarm condition. When the application detects an alarm condition and sends an alarm message to the alarm board, the alarm board will pass the alarm information to the maintenance center. If the alarm board fails, the application can send messages directly to the maintenance center.

6.3 System Status

This section identifies whether the application, alarm board, or maintenance center is responsible for setting each System Status mode, and describes how the alarm board handles alarm notification when the system is in a particular System Status mode.

6.3.1 Active

Both the alarm board and the application can set the System Status to Active. If the alarm board detects an alarm condition while the system is Active, it will activate the appropriate Alarm Status LED, audible alarm, and remote outputs and send alarm messages to the maintenance center. If alarm conditions are already present, the highest priority alarm will be indicated.

6.3.2 Out of Service

Both the alarm board and the application can set the System Status to Out of Service. If the alarm board detects an alarm condition while the system is Out of Service, it will not activate the appropriate Alarm Status LED, audible alarm, or remote outputs until the system returns to Active or Standby. Alarm messages will still be sent to the maintenance center.

6.3.3 Standby

Both the alarm board and the application can set the System Status to Standby. If the alarm board detects an alarm condition while the system is in Standby, it will activate the appropriate Alarm Status LED, audible alarm, and remote outputs and send an alarm message to the maintenance center. If alarm conditions are already present, the highest priority alarm will be indicated.

6.3.4 Unavailable

In accordance with the LSSGR, Unavailable should be initiated by the maintenance center only. The application should send a message to the alarm board setting the System Status to Unavailable only if the maintenance center has requested it to do so. A system can be taken out of Unavailable only if the application sends a message to the alarm board setting the System Status to Active at the maintenance center's request.

If the alarm board detects an alarm condition while the system is Unavailable, it will not activate the appropriate Alarm Status LED, audible alarm, or remote outputs until the system returns to Active. Alarm messages will still be sent to the maintenance center.

6.4 Alarm Board Messages

6.4.1 Messages from the Application to the Alarm Board

Message*	Meaning
A^TMI-INIT:^TIME=hh.mm	initialize time
A^TMI-INIT:^DATE=mm/dd/yy	initialize date
A^TMI-INIT:^NAME=<up to 50 char>	initialize system name
A^TMI-ALARM-SET:^CRITICAL=<msg>	set critical alarm
A^TMI-ALARM-CLR:^CRITICAL=<msg>	clear critical alarm
A^TMI-ALARM-SET:^MAJOR=<msg>	set major alarm
A^TMI-ALARM-CLR:^MAJOR=<msg>	clear major alarm
A^TMI-ALARM-SET:^MINOR=<msg>	set minor alarm
A^TMI-ALARM-CLR:^MINOR=<msg>	clear minor alarm
A^TMI-TIMER:^RESET	reset alarm board watchdog timer
A^TMI-TIMER:^DELAY=<secs-1 to 3600>	extend timer delay period for one period
A^TMI-SYSTEM:^ACTIVE	set system status to Active
A^TMI-SYSTEM:^STANDBY	set system status to Standby
A^TMI-SYSTEM:^OUT^OF^SERVICE	set system status to Out of Service
A^TMI-SYSTEM:^UNAVAILABLE	set system status to Unavailable
A^TMI-OUTPUT:^CLOSE=<output #>	close specified output
A^TMI-OUTPUT:^OPEN=<output #>	open specified output
A^TMI-OUTPUT:^ALARM=<output #>	return control to alarm board
A^TMI-REQ:^SYSTEM	request system status
A^TMI-REQ:^ALARM	request alarm status
A^TMI-REQ:^VERSION	request alarm board firmware version
A^TMI-REQ:^STATE	request all active conditions

* ^ indicates space character. All messages end with carriage return - line feed.

6.4.2 Messages from the Alarm Board to the Application

Message*	Meaning
^^TMI-TIMER:-ACK	timer reset message acknowledged
^^TMI-ALARM-SET:-ACK	alarm-set message acknowledged
^^TMI-ALARM-CLR:-ACK	alarm-clr message acknowledged
^^TMI-SYSTEM:-ACK	system message acknowledged
^^TMI-INIT:-ACK	init message acknowledged
^^TMI-OUTPUT:-ACK	output control message acknowledged
^^TMI-REQ:^SYSTEM=ACTIVE ^^TMI-REQ:^SYSTEM=OUT^OF^SERVICE ^^TMI-REQ:^SYSTEM=STANDBY ^^TMI-REQ:^SYSTEM=UNAVAILABLE	response to system status request
^^TMI-REQ:^ALARM=CRITICAL ^^TMI-REQ:^ALARM=MAJOR ^^TMI-REQ:^ALARM=MINOR ^^TMI-REQ:^ALARM=NONE ^^TMI-REQ:^ALARM=ACKNOWLEDGED	response to alarm conditions
^^TMI-REQ:^VERSION=<version number>	alarm board firmware version
^^TMI-REQ:^STATE=<active conditions>	active conditions
^TMI-ERROR:^BAD^COMMAND	unrecognized command received

* ^ indicates space character. All messages end with carriage return - line feed.

6.5 Writing Application Software

The application should:

1. perform diagnostic tests.
2. detect alarm conditions including:
 - the alarm board
 - all boards in the backplane
 - hard and floppy drives
 - the application itself
3. send messages to the alarm board to:
 - reset the alarm board's watchdog timer
 - initialize the date and time
 - activate alarms
 - request system information
 - specify a message to be sent periodically to the maintenance center
 - take control of the remote outputs
4. communicate with the maintenance center using:
 - alarm notification messages
 - responses to information requests

Figure 5 illustrates the communications possible between the alarm board, application, and maintenance center. Table 1 identifies the messages and features the application must be capable of sending and performing according to LSSGR requirements.

FIGURE 5

Communications

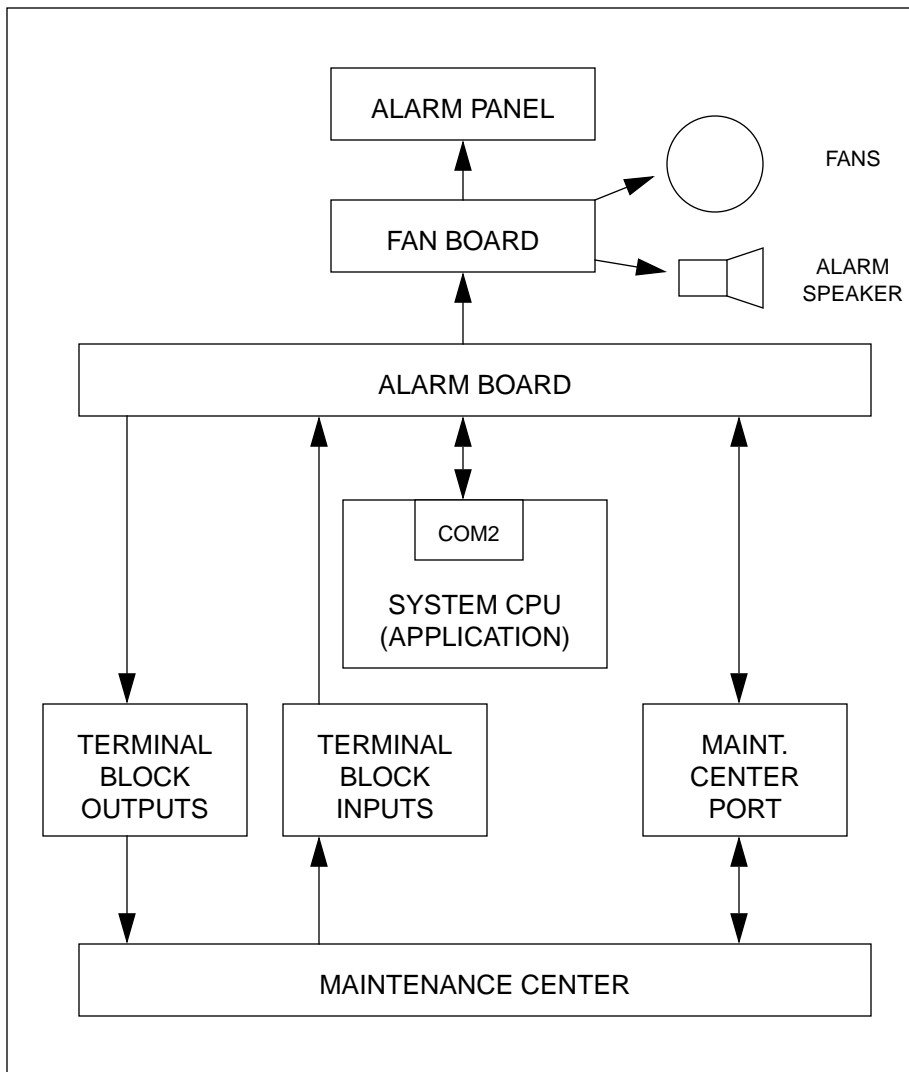


Table 1: Required Tests and Messages

Requirement	Description
Diagnostic tests	Test all PC boards, disk drives, the alarm board, and the application itself.
Timer reset message	Sets the alarm board's watchdog timer
Alarm messages	Tell the alarm board to activate alarms (may include alarm information to be sent to the maintenance center).

6.5.1 Performing Tests

The application must perform system diagnostic tests in order to comply with the LSSGR. The application is responsible for testing and identifying failures in the following:

- the alarm board
- all boards in the backplane
- hard and floppy drives
- the application itself

6.5.1.1 Testing the Alarm Board

The application should monitor the alarm board by using a watchdog timer or similar mechanism. If the application does not receive an acknowledgment message within two seconds after it sends a message to the alarm board, the application should send a message to the maintenance center indicating alarm board failure.

6.5.1.2 Testing All the Boards in the Backplane

The application should test all boards integrated into the system at power-up and periodically thereafter. Tests on voice boards may consist of existing software and application-specific diagnostics. If the application detects a problem with any or all the boards, it must send an alarm message to the alarm board instructing it to activate alarms.

6.5.1.3 Testing Hard and Floppy Drives

The application should test the drives at power-up and periodically thereafter. If the application detects a problem, it must send an alarm message to the alarm board instructing it to activate alarms.

6.5.1.4 Testing the Application

The application should test itself at power-up and periodically thereafter. *Note: The application must send messages to the alarm board instructing it to activate alarms if it detects a failure in any of the components except the alarm board.*

6.5.2 Message Protocol

The application communicates with the alarm board and the maintenance center according to the Man-Machine Language (MML) protocol and alarm board communications protocol specified below. MML requirements can be found in *Bell Communications MML Requirements, Technical Reference TR-TSY-000012, Issue 1, January, 1985*.

1. The application must configure COM2 at a baud rate of 1200, 8 data bits, 1 stop bit, no parity, full duplex.
2. All messages must be sent in ASCII format, terminate with a carriage return (13, 0DH) and line feed (10, 0AH), and be less than 80 characters long.
3. Messages intended for the alarm board must begin with the letters "A^^TMI".
4. Any message that does not begin with the letters "A^^TMI" will be forwarded directly to the maintenance center.

The alarm board returns a "A^^TMI-ERROR:BAD COMMAND" error message if the application sends a message beginning with "A^^TMI" that does not follow the format specified in items 1. and 2. above.

Note: A "^" is used in this section to indicate spaces in line messages.

6.5.3 Messages to the Alarm Board

The application can send seven kinds of messages to the alarm board:

- timer reset messages
- initialization messages
- alarm messages
- system status messages
- information request messages
- messages to change the function of the hard-contact outputs
- periodic background messages

6.5.3.1 Timer Reset Message

The application must reset the alarm board watchdog timer by sending the message:

A^^TMI-TIMER:^RESET

at least once every thirty seconds (every twenty seconds is recommended). The application must start sending this message starting not more than four minutes (initial delay period) after the alarm board is powered up unless a longer delay period is specified.

Once the application sends this message, the alarm board expects to receive timer reset messages at least once every thirty seconds thereafter. The alarm board will activate the alarms indicating a Host PC Communication failure if the application fails to send this message at least once every thirty seconds.

If more time is needed to boot the system, the application programmer may set an additional delay period of up to one hour using the following message.

A^^TMI-TIMER:^DELAY=<sec. from 1 to 3600>

Once the extended delay period expires, or if a timer reset message is received before the delay period expires, the alarm board will expect to receive timer reset messages at least once every thirty seconds thereafter. The alarm board will acknowledge both of the preceding messages within two seconds by sending a “^^^TMI-TIMER:^ACK” message to the application.

Note: Messages the application sends to the alarm board to set the System Status will also reset the watchdog timer.

6.5.3.2 Initialization Messages

Table 2 lists the messages the application should send to the alarm board to identify the system by name and initialize the time and date. The alarm board will return the listed acknowledgment messages within two seconds.

Table 2: Initialization Messages

Message from the Application to the Alarm Board	Response from the Alarm Board
A^^TMI-INIT:^TIME=<hh:mm>	^^TMI-INIT:^ACK
A^^TMI-INIT:^DATE=<mo/dy/yr>	^^TMI-INIT:^ACK
A^^TMI-INIT:^NAME=<50 char name>	^^TMI-INIT:^ACK

Once these initialization messages are sent, the Alarm Cut-off acknowledgment message and all alarm messages the alarm board sends to the maintenance center will be preceded by a message in the following form:

^^^MO/DY/YR^^HH:MM^^<system name>

6.5.3.3 Alarm Notification Messages

Alarm conditions detected by the application must be indicated by the LED's on the alarm panel. The application is responsible for telling the alarm board which System Status and Alarm Status LED's to light and what alarm message should be passed on the maintenance center. The application accomplishes these tasks via alarm messages and system status messages.

Alarm Messages

The application should send alarm messages to the alarm board to activate and clear alarms for application-detected alarm conditions. The alarm board will notify the maintenance center when alarms are set and cleared. Each message the application sends:

- must specify whether alarms should be set or cleared. The application must send an alarm-clear message for each alarm it has set.
- must specify alarm type (Critical, Major, or Minor) according to the definitions listed in Section 6.4.
- should include information the alarm board will transmit to the maintenance center. We recommend including this information in your alarm messages for these reasons:
 1. The alarm message sent by the alarm board to the maintenance center identifies whether the alarm is Critical, Major, or Minor, and whether the alarm is being set or cleared. This information is not sufficient to quickly diagnose the system's problem and dispatch a craftperson to repair the machine.
 2. If more than one alarm condition exists, only the highest priority alarm will be indicated on the front panel and via the audible alarm and remote outputs. The only way the craftperson can know that multiple alarm conditions exist and readily identify all alarm conditions present is by reading the alarm messages received at the maintenance center. Table 3 lists the alarm messages the application should send to the alarm board and the corresponding message the alarm board will send to the maintenance center.

Table 3: Alarm Messages

Message from the Application to the Alarm Board	Message from the Alarm Board to the Maintenance Center
A^TMI-ALARM-SET:^CRITICAL=<msg>	*C^ALARM-SET:^APPL=<msg.>
A^TMI-ALARM-CLR:^CRITICAL=<msg>	*C^ALARM-CLR:^APPL=<msg.>
A^TMI-ALARM-SET:^MAJOR=<msg>	**^ALARM-SET:^APPL=<msg.>
A^TMI-ALARM-CLR:^MAJOR=<msg>	**^ALARM-CLR:^APPL=<msg.>
A^TMI-ALARM-SET:^MINOR=<msg>	*^ALARM-SET:^APPL=<msg.>
A^TMI-ALARM-CLR:^MINOR=<msg>	*^ALARM-CLR:^APPL=<msg.>

Note: **C indicates a Critical alarm*
 *** indicates a Major alarm*
 ** indicates a Minor alarm*

The alarm board will acknowledge the application's messages within two seconds by sending one of the following messages to the application:

^^^TMI-ALARM-SET:^ACK
^^^TMI-ALARM-CLR:^ACK

System Status Messages

The application must also tell the alarm board to change the System Status display on the alarm panel so the LED corresponds to the current alarm. The application may tell the alarm board to change the System Status display if:

- it detects an alarm condition.
- the maintenance center has requested the application to change the System Status to Unavailable.
- the maintenance center has requested the application to place an Unavailable system in Active mode.

Table 4 lists the messages the application should send to set the System Status and the messages the alarm board will return within two seconds.

Table 4: system Status Messages

Message from the Application to the Alarm Board	Response from the Alarm Board
A^TMI-SYSTEM:^ACTIVE	^^TMI-SYSTEM:^ACK
A^TMI-SYSTEM:^STANDBY	^^TMI-SYSTEM:^ACK
A^TMI-SYSTEM:^OUT^OF^SERVICE	^^TMI-SYSTEM:^ACK
A^TMI-SYSTEM:^UNAVAILABLE	^^TMI-SYSTEM:^ACK

The alarm board will change the current System Status LED at the application's request **unless** the alarm board has placed the system in Out of Service mode. These messages will also reset the alarm board's watchdog timer.

*Note: The application should send "A^^TMI-SYSTEM:^UNAVAILABLE" **only** if it receives a request from the maintenance center to place the system in Unavailable mode.*

6.5.3.4 Information Request Messages

Table 5 lists the information requests the application can send to the alarm board and the alarm board's possible responses to these requests.

Table 5: Application Requests

Request from the Application to the Alarm Board	Response from the Alarm Board to the Application
A^TMI-REQ:^SYSTEM	^^TMI-REQ:^SYSTEM=ACTIVE ^^TMI-REQ:^SYSTEM=OUT^OF^SERVICE ^^TMI-REQ:^SYSTEM=STANDBY ^^TMI-REQ:^SYSTEM=UNAVAILABLE
A^TMI-REQ:^ALARM	^^TMI-REQ:^ALARM=CRITICAL ^^TMI-REQ:^ALARM=MAJOR ^^TMI-REQ:^ALARM=MINOR ^^TMI-REQ:^ALARM=NONE ^^TMI-REQ:^ALARM=ACKNOWLEDGED
A^TMI-REQ:^VERSION	^^TMI-REQ:^VERSION=<version number>
A^^TMI-REQ:STATE	^^TMI-REQ:^STATE=<active conditions>

Only alarm conditions that have not been acknowledged via Alarm Cut-off (unacknowledged alarm conditions) will be identified by alarm type. If alarm conditions that have been acknowledged via Alarm Cut-off (acknowledged alarm conditions) are present, the alarm board will return the message:

^^^TMI-REQ:^ALARM=ACKNOWLEDGED

The request “A^^TMI-REQ:^STATE” returns a list of all active conditions. Table 6 lists all possible active conditions.

Table 6: Possible Active Conditions

Condition	Meaning
BREAKER	input voltage failure present
TEMP	temperature has risen above 50 °C (122 °F)
ACK	Alarm Cut-off button is being held down
FAN	at least one fan is not turning
OVER	output voltage above normal
UNDER	output voltage below normal
CRITICAL	Critical application alarm present
MAJOR	Major application alarm present
MINOR	Minor application alarm present
COMM	host PC communication failure
BATT	battery failure

6.5.3.5 Messages to Change the Function of the Outputs

The application can assume control of hard-contact outputs (1), (2), (3), and (4). Normally, these outputs correspond to Critical, Major, Minor and Fuse alarms. Table 7 lists and describes the messages the application can send to the alarm board to control the outputs.

Table 7: Controlling the Outputs

Message from the Application to the Alarm Board	Meaning
A^^TMI-OUTPUT:^CLOSE=<output#>	Close the specified output.
A^^TMI-OUTPUT:^OPEN=<output#>	Open the specified output.
A^^TMI-OUTPUT:^ALARM=<output#>	Return the specified output to the alarm board's control.

The alarm board will respond to these messages within two seconds by sending the message “^^^TMI-OUTPUT:^ACK”.

6.5.4 Messages to the Maintenance Center

All messages the application sends to the maintenance center are transmitted to the maintenance center by the alarm board, as long as the alarm board has not failed. These messages must comply with the format specified in Section 6.5.2 and the Bell Communications Research MML Requirements Technical Reference TR-TSY-000012. As a general rule, the alarm board will ignore any message that does not begin with the letters “A^^TMI” and will pass it on to the maintenance center.

The application can send three kinds of messages to the maintenance center:

- nonalarm, informational messages
- responses to requests for application information
- responses to requests for alarm board information

6.5.4.1 Nonalarm, Informational Messages

The application can send general information to the maintenance center.

6.5.4.2 Responses to Requests for Application Information

The craftperson at the maintenance center may access information about the application.

6.5.4.3 Responses to Requests for Alarm Board Information

Requests from the maintenance center for information such as System Status, Alarm Status, etc., are sent to the application. The application then asks the alarm board for this information directly via request messages and returns the information to the maintenance center via another line message.

Note: Information about application-detected alarm conditions can be sent to the maintenance center using the messages described in Section 6.5.3.3.

6.5.5 Messages from the Alarm Board

The application can receive three kinds of messages from the alarm board:

- acknowledgment messages
- responses to information requests
- error messages

6.5.5.1 Acknowledgment Messages

The alarm board will return an acknowledgment message to the application when the application sends any kind of message to the alarm board except messages for the maintenance center. Table 8 lists all the acknowledgment messages the application can receive from the alarm board.

Table 8: Acknowledgment Messages

Messages	Meaning
^^TMI-TIMER:^ACK	Timer reset message received
^^TMI-ALARM-SET:^ACK	Alarm-set message received
^^TMI-ALARM-CLR:^ACK	Alarm-clear message received
^^TMI-SYSTEM:^ACK	System status message received
^^TMI-INIT:^ACK	Initialization message received
^^TMI-MESG:^ACK	Background message received
^^TMI-OUTPUT:^ACK	Output control message received

6.5.5.2 Responses to Information Requests

The application receives responses to its requests for alarm board version number, System Status information, and Alarm Status information. The application must be able to decipher these messages. Table 9 lists all the responses the application can receive from the alarm board.

Table 9: Responses to Requests

Message	Meaning
^^TMI-REQ:^SYSTEM=ACTIVE	System is Active
^^TMI-REQ:^SYSTEM=OUT^OF^SERVICE	System is Out of Service
^^TMI-REQ:^SYSTEM=STANDBY	System is in Standby
^^TMI-REQ:^SYSTEM=UNAVAILABLE	System is Unavailable
^^TMI-REQ:^ALARM=CRITICAL	Unacknowledged Critical alarm(s) present
^^TMI-REQ:^ALARM=MAJOR	Unacknowledged Major alarm(s) present
^^TMI-REQ:^ALARM=MINOR	Unacknowledged Minor alarm(s) present
^^TMI-REQ:^ALARM=NONE	No alarms present
^^TMI-REQ:^ALARM=ACKNOWLEDGED	Acknowledged alarm(s) present
^^TMI-REQ:^VERSION=<version number>	Gives alarm board firmware version number
^^TMI-REQ:^STATE=<active conditions>	Lists active conditions

Refer to Section 6.5.3.4 for more about information requests.

6.5.5.3 Error Messages

The alarm board will return a “^^^TMI-ERROR: ^BAD ^COMMAND” message to the application if the application sends a message to the alarm board that begins a “A^^TMI” but does not adhere to the message protocol outlined in Section 6.5.2.

Note: Any message the alarm board receives from the application that does not begin with the letters “A^^TMI” will be automatically forwarded to the maintenance center.

6.5.6 Messages from the Maintenance Center

The application must be able to receive messages from the maintenance center. These messages may consist of information requests and other messages. See Section 6.5.3.3 and Section 6.5.4 for more information.

6.6 Maintenance Center Communications

This section describes the kinds of messages the maintenance center can receive from and send to the application and alarm board over the rear panel serial port.

6.6.1 Messages to the Alarm Board

The maintenance center can send two messages to the alarm board. These messages must comply with the protocol explained in Section 6.5.2. Table 10 lists and defines these messages.

Note: The alarm board does not send error messages if the maintenance center sends a message beginning with the letters “A^^TMI” that does not match either of the messages specified in the table. Incorrectly formatted messages will be passed on to the application.

Table 10: Messages to the Alarm Board

Message from the Maintenance Center to the Alarm Board	Response from the Alarm Board	Meaning
A^^TMI-REMOTE:^RESET	^^TMI-REMOTE:^ACK	Reset the CPU board
A^^TMI-REMOTE:^CUT-OFF	^^TMI-REMOTE:^ACK	Activate Alarm Cutoff (disable alarms)

6.6.2 Messages to the Application

All messages the maintenance center sends to the application are transmitted to the application by the alarm board as long as the alarm board has not failed. Messages from the maintenance center to the application may consist of the following:

- requests for alarm board information
- requests for application information
- requests to change the System Status to Unavailable
- requests to place an Unavailable system in Active mode
- other messages

Note: According to the LSSGR, a system should be taken out of Unavailable mode only if the maintenance center requests the application to set the System Status to Active.

6.6.3 Messages from the Alarm Board

The maintenance center can receive three types of messages from the alarm board:

- alarm messages
- acknowledgment messages
- system identification messages

6.6.3.1 Alarm Messages

Alarm messages from the alarm board indicate both application-detected and alarm board-detected alarm conditions. Messages indicating alarm conditions detected by the application include alarm information specified by the application. Complete lists of alarm messages are given in Table 11 and Table 12.

Note: *C indicates a Critical alarm
** indicates a Major alarm
* indicates a Minor alarm

Table 11: Messages Indicating Application-Detected Alarm Conditions

*C^ALARM-SET:^APPL=<msg.>
*C^ALARM-CLR:^APPL=<msg.>
**^ALARM-SET:^APPL=<msg.>
**^ALARM-CLR:^APPL=<msg.>
*^ALARM-SET:^APPL=<msg.>
*^ALARM-CLR:^APPL=<msg.>

Table 12: Messages Indicating Alarm Board-Detected Alarm Conditions

*C^ALARM-SET:^BATTERY^POWER^FAILURE	**^ALARM-SET:^TEMPERATURE^HIGH
*C^ALARM-CLR:^BATTERY^POWER^RESTORED	**^ALARM-CLR:^TEMPERATURE^RESTORED
*C^ALARM-SET:^INPUT^POWER^FAILURE	*^ALARM-SET:^FAN^FAILURE
*C^ALARM-CLR:^INPUT^POWER^RESTORED	*^ALARM-CLR:^FAN^RESTORED
*^ALARM-SET:^NO^BATTERY^PRESENT	*C^ALARM-SET:^CIRCUIT^BREAKER^TRIPPED
*^ALARM-SET:^LOW^BATTERY^CHARGE	*C^ALARM-CLR:^CIRCUIT^BREAKER^RESTORED
*C^ALARM-SET:^12VOLTS^LOW	*C^ALARM-CLR:^5VOLTS^RESTORED
*C^ALARM-SET:^12VOLTS^HIGH	*C^ALARM-CLR:^12VOLTS^RESTORED
*C^ALARM-SET:^~12VOLTS^LOW	*C^ALARM-CLR:^~12VOLTS^RESTORED
*C^ALARM-SET:^~12VOLTS^HIGH	*C^ALARM-SET:^COMMUNICATION^FAILURE
*C^ALARM-SET:^5VOLTS^LOW	*C^ALARM-CLR:^COMMUNICATION^RESTORED
*C^ALARM-SET:^5VOLTS^HIGH	

6.6.3.2 Acknowledgment Messages

The alarm board sends acknowledgment messages to the maintenance center when:

the system is reset via a message from the maintenance center.

Alarm Cut-off is activated via the Alarm Cut-off button or a message from the maintenance center.

The alarm board sends the following acknowledgment message in response to messages activating Reset or Alarm Cut-off:

6.6.3.3 System Identification Messages

These messages indicate the time, date, and system name as specified by the application. The alarm board sends these messages anytime it sends a message to the maintenance center, as long as the application has initialized the date and time and identified its system name using the initialization messages listed in Section 6.5.3.2. The system identification message has the following form:

^^^MM/DD/YY^^HH:MM^<system name>

6.6.4 Messages from the Application

The maintenance center may receive up to four kinds of messages from the application:

- nonalarm, informational messages
- messages indicating alarm board failure
- responses to requests for application information
- responses to requests for alarm board information

The messages comply with the format specified in Section 6.5.2 and the *Bell Communications Research MML Requirements Technical Reference TR-TSY-000012*.

6.6.4.1 Nonalarm, Informational Messages

These messages consist of general information.

6.6.4.2 Responses to Requests for Application Information

The maintenance center can receive messages providing information about the application.

6.6.4.3 Responses to Requests for Alarm Board Information

The maintenance center can receive messages providing Alarm Status, System Status, and other information the application retrieves from the alarm board.

Specifications

Parameter	Condition	Specification
Temperature	Non-Operating	-40°C to +70°C (-40°F to +158°F)
	Operating	0°C to +55°C (+32°F to +131°F)
Humidity	Non-Operating	5% to 90%, non-condensing
	Operating	20% to 80%, non-condensing
Shock	Non-Operating	30G @ 20 millisecond half-sine pulse
	Operating	10G @ 11 milliseconds half-sine pulse
Vibration	Non-Operating	3G RMS 5-500 Hz
	Operating	1G RMS 0-100 Hz
Altitude	Non-Operating	-200 to 50,000 feet
	Operating	-200 to 15,000 feet

Dimensions: 19"W x 6.97"H x 21"D

Weight: 40 lbs. (18.14 Kg.)

Power - Input:

375-watt with AC line auto selection power supply
operating: 90 to 264 VAC at 47 to 63 Hz

Power - Output:

375-watt with AC line auto selection power supply
+5 VDC @ 42 Amp
+12 VDC @ 13 Amp (20 pk)
-12 VDC @ .5 Amp
-5 VDC @ .5 Amp
MTBF greater than 500,000 hours at 30°C.

Note: A minimum 5 Amp load at +5V is required for the power supply to regulate properly over the full temperature range specified.